With regard to the indefiniteness rejection, "the object" has been changed to --an object--.

Claims 1, 3-5 and 10-12 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,099,056 to Siniaguine et al. Claims 2 and 6 are separately rejected as being obvious over Siniaguine et al.

In Siniaguine et al., there is an annular groove 12, as shown in Fig. 1B of the reference. Gas is blown into the annular groove 12, and the gas circles around the inside of the annular groove 12. With this action, gas also circles, and the negative pressure occurs, between the annular groove 12 and a wafer-like article 16.

Independent claim 1 has been amended to recite a <u>hole-like</u> concave opening. The hole-like opening is in contrast to the annular groove 12 of the reference. In addition, independent claim 25 has been added which recites that the fluid passageway ends at an opening through the inner peripheral surface. On the other hand, Siniaguine et al. has a fluid passageway which terminates into an upper surface of the annular groove 12. That is, Siniaguine et al. has a gas conducting conduit 15 with an opening 24 in a ceiling surface 14.

With the annular groove of Siniaguine et al., gas circulates between an inner wall 17 and an outer wall 18 in the annular groove 12. The annular groove 12 has a large surface area, and there is a lot of friction between the circulating gas and the inside of the annular groove 12. On the other hand, when air circulates in a hole-like concave opening, the friction between the air and the opening is significantly smaller. The air may travel in the circular shape of a tornado within the hole-like concave opening to create a strong negative pressure.

According to claim 25, the fluid passageway terminates at an opening through the inner peripheral surface. On the other hand, the Siniaguine et al. fluid passageway terminates at the ceiling surface 14. This difference also allows the invention to create a larger air flow relative to that of Siniaguine et al.

In Siniaguine et al., surface 11 opposes a wafer around the annular groove 12. In this area, there is a wall of weak negative pressure. The weak negative pressure is thought to be especially suitable for grasping a brittle wafer. On the other hand, since the present invention can create a strong negative pressure, the invention may be more suitable for grasping a heavy, larger-size wafer.

Siniaguine et al. describes at column 5, lines 24-35 that the device may be used with a wafer for plasma etching. The reference asserts that the surface 11, which faces the wafer,

works to transfer heat from the article and reduce the temperature. That is, although the reference provides only a weak holding power, when heat transfer is necessary, the device of the reference functions well. On the other hand, the device of the invention has a strong holding power, which could be used to support a heavy wafer.

The following table summarizes the differences between the claimed devices and that disclosed in Siniaguine et al.

| Structure difference | Hole-Like Opening/Termination at Inner Peripheral Surface | Channel Opening/Termination at Upper Surface |
|---|---|---|
| Volume of low-pressure area | Big | Small |
| Air volume to flow into the area | Big | Small |

| Difference of the Effect | Hole-Like Opening/Termination at Inner Peripheral Surface | Channel Opening/Termination at Upper Surface |
|---|---|---|
| When the wafer slants by some force against the wafer; as shown above; | A large air flow occurs because of the width between the wafer and a flat-end-face. With the large flow, a strong upward force occurs at the wafer. Therefore, the wafer returns to being parallel to the flat-end-face. | A large, stabilizing air flow cannot occur because there is a lot of air friction associated with the annular groove. Therefore, if the wafer slants, the wafer drops easily, even if the slant is small. |
| Consequently; | Suitable for a robot wafer carrying head, that moves from one place to another. In this case, large forces may affect the wafer by inertia of the wafer, when the carrying head stops and starts. | Suitable for a head that has heating means such as plasma treatment. With a smaller air flow, heat transfer can stabilize the temperature of the wafer. |
| Conclusion | Suitable for big and heavy wafers. | Suitable for small and light wafers. |

Referring to the attached diagram, it can be seen that a strong low pressure air is created within the hole-like opening. On the other hand, a low pressure is created above the annular groove in Siniaguine et al. As shown by the two lower drawings, if there is an air flow from the outside (represented by the red arrows), the wafer will be destabilized. However, the strong negative pressure, which may be associated with the invention is sufficient to create a counter balancing flow which causes the wafer to again become parallel with the holder. On the other hand, if the supported wafer is disturbed by the same air flow using the device of Sinaigine et al., the low pressure air is not strong enough to re-stabilized the wafer. Because of these differences, the invention can be used for a robot, which moves wafers from one place to another. Even if the robot changes direction or stops and then starts, the inertia of the wafer is not sufficient to loose control of the wafer. With the device of Siniaguine et al., small wafers can be supported. The air flow out of the annular groove is sufficiently low so as not to disrupt heat from traveling from the wafer to the device.

In accordance with the foregoing, it is submitted that the claims patentably distinguish over Siniaguine et al. Withdrawal of the rejections is requested.

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

STAAS & HALSEY LLP

Date: January 24, 2003

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## VERSION WITH MARKINGS TO SHOW CHANGES MADE

**IN THE CLAIMS:**

Please CANCEL claims 2 and 15-24.

Please AMEND the following claims:

1. (ONCE AMENDED) Non-contacting conveyance equipment comprising:

a <u>hole-like</u> concave opening having a continuous walled inner peripheral surface;

an end face that opposes [the]<u>an</u> object to be conveyed, the end face being formed in the concave opening; and

a fluid passageway comprising a spout facing the inside of the concave opening, to supply fluid to the inner peripheral surface of the concave opening so as to cause a swirl of fluid within the concave opening.

Please ADD the following claims:

25. (NEW) Non-contacting conveyance equipment comprising:

a oncave opening having a continuous walled inner peripheral surface;

an end face that opposes an object to be conveyed, the end face being formed in the concave opening; and

a fluid passageway comprising a spout facing the inside of the concave opening, the fluid passageway ending at an opening through the inner peripheral surface, to supply fluid to the inner peripheral surface of the concave opening so as to cause a swirl of fluid within the concave opening.

26. Non-contacting conveyance equipment according to claim 25, wherein the spout is approximately tangential to the inner peripheral surface.

27. Non-contacting conveyance equipment according to claim 25, wherein a plurality of spouts face the inside of the concave opening such that the plurality of spouts together cause the swirl of fluid within the concave opening.

28. Non-contacting conveyance equipment according to claim 25, further comprising a centering guide to maintain the object to be conveyed such that the object opposes the end face.

29. Non-contacting conveyance equipment according to claim 28, wherein
the non-contacting conveyance equipment has an outer periphery, and
the centering guide comprises at least three centering protrusions provided around the outer periphery.

30. Non-contacting conveyance equipment according to claim 29, wherein
the centering protrusions are radially displaced from a center of the non-contacting conveyance equipment, and
the non-contacting conveyance equipment further comprises a centering mechanism to vary the radial distance of the centering protrusions from the center of the non-contacting conveyance equipment.

31. Non-contacting conveyance equipment according to claim 30, wherein the centering mechanism comprises:
a rotatable disk; and
arms linking each centering protrusion to the rotatable disk such that rotation of the rotatable disk changes the radial distance of the centering protrusions from the center of the non-contacting conveyance equipment.

32. Non-contacting conveyance equipment according to claim 31, wherein the centering mechanism is pneumatically driven.

33. Non-contacting conveyance equipment according to claim 25, further comprising a base with a plurality of concave openings are provided on the base, each concave opening having an end face formed therein and a fluid passageway comprising a spout facing the inside thereof.

34. Non-contacting conveyance equipment according to claim 33, wherein the spouts of the concave openings face different directions such that fluid swirls in a clockwise direction in a first portion of the concave openings and fluid flows in a counter clockwise direction in a second portion of the concave openings.

35. Non-contacting conveyance equipment according to claim 33, wherein the base is surrounded with a peripheral edge to block a flow of fluid off the base.

36. Non-contacting conveyance equipment according to claim 35, wherein the peripheral edge has a stepped shape.

37. Non-contacting conveyance equipment according to claim 33, further comprising at least one fluid discharge passage provided in the base to eliminate fluid supplied through the spouts.